ISSN 0704-3716

Canadian Translation of Fisheries and Aquatic Sciences

No. 5543

Female reproductive cycles in some mustelids

P. I. Danilov, and I. L. Tumanov

Original title: Reproduktivnyye tsikly samok nekotorykh kun'ikh (Mustelidae)

In: Byull. Mosk. Obva. Ispyt. Prir. Otd. Biol./[Bull. Moscow Soc. Nat. Biol. Sect.] 80(5): 35-47, 1975

Original language: Russian

Available from:
Canada Institute for Scientific and Technical Information
National Research Council
Ottawa, Ontario, Canada K1A 0S2

1991

26 typescript pages

Secretary of State / Secrétariat d'État

MULTILINGUAL SERVICES DIVISION – DIVISION DES SERVICES MULTILINGUES

TRANSLATION BUREAU BUREAU DES TRADUCTIONS

LIBRARY IDENTIFICATION – FICHE SIGNALÉTIQUE

92-00832/

Translated from - Traduction de	Into - En
Russian	English

Author - Auteur

P. I. Danilov and I. L. Tumanov

Title in English or French - Titre anglais ou français

Female Reproductive Cycles in Some Musteilds

Title in foreign language (Transliterate foreign characters)
Titre en langue étrangère (Transcrire en caractères romains)

REPRODUKTIVNYYE TSIKLY SAMOK NEKOTORYKH KUN'IKH (MUSTELIDAE)

Reference in foreign language (Name of book or publication) in full, transliterate foreign characters.
Référence en langue étrangère (Nom du livre ou publication), au complet, transcrire en caractères romains.

BYULLETEN' M. O-BA ISP. PRIPODY, OTD. BIOLOGICH.

Reference in English or French - Référence en anglais ou français

BULLETIN OF THE MOSCOW SOCIETY OF NATURALISTS, BIOLOGICAL SECTION

Publisher - Éditeur	DATE OF PUBLICATION / DATE DE PUBLICATION			Page Numbers in original / Numéros des pages dans l'original
	Year / Année	Volume	Issue No. / Numéro	35-46
Place of Publication / Lieu de publication				Number of typed pages / Nombre de pages dactylographiées
Moscow	1975	LXXX(5)		25

Requesting Department / Ministère-Client: Dept. of Fisheries and Oceans

Translation Bureau No. / Notre dossier nº: LSM-1-00523 3850548

Branch or Division / Direction ou Division: Scientific Publications - Comms.

Translator (Initials) / Traducteur (Initiales): JEP

Person requesting / Demandé par: Dr. Gary Stenson
NW Atlantic Fisheries Centre
P.O. Box 5667, St. John's, Newfoundland
A1C 5X1

Your Number / Votre dossier nº:

Date of Request / Date de la demande: 07-18-91

Canada

SEC 3-111 (84-10)

Department of the Secretary of State of Canada | Secrétariat d'État du Canada

TRANSLATION LETTERHEAD - PAPIER À EN-TÊTE

MULTILINGUAL TRANSLATION DIRECTORATE
TRANSLATION BUREAU

DIRECTION DE LA TRADUCTION MULTILINGUE
BUREAU DE LA TRADUCTION

Originator File No. - Référence du demandeur	Department - Ministère	Division/Branch - Division/Direction	City - Ville
	Fisheries and Ocean	Communications	Ottawa
Translation Request No. - N° de la demande de traduction	**Language - Langue**	**Translator (Initials) - Traducteur (initiales)**	
3850548	Russian	JEP	

Female Reproductive Cycles in Some Mustelids [1]

P. I. Danilov, I. L. Tumanov

For the present report we had the following number of females available: the wolverine - 4 (in February and March - 2 specimens each), the badger - 17 (in April -1, May - 2, June - 3, July, September, and October - 2 specimens each, December - 5), and the otter - 30 (in January - 2, March - 7, May - 2, June - 1, October - 4, November - 6, December - 8).

---

[1] See also the article in the "Byull. MOIP", otd. biol., ("Bulletin of the Moscow Society of Naturalists", biology section), 1975, vol. 81, iss. 1).

Wolverine (Gulo gulo L.)

Our material does not make it possible to trace the chronology of the wolverine sexual cycle, it only makes it possible to draw some hypotheses about its periods of heat.

An adult female (3+), obtained in the middle of February, was pregnant. Judging from the state of its sexual sphere (the uterus was hyperemic, its muscle walls were thickened, its mucous membrane was highly tortuous, there were large functioning corpora lutea, up to 1500 μ in diameter, in the ovaries and rather large atretic vesicular follicles in the majority of them), and at this time the implantation of blastocysts was taking place.

In a young female (1+) in the middle of March there were no signs of the activation of the sexual sphere. The epithelium of the vagina was 2-3 rows thick, the uterus was infantile, the muscle walls were thick, and in the ovaries there were primordial and small developed atretic follicles, up to 250 μ in diameter. The uterus was 27.5 mm long, its left horn - 68.0, and its right horn - 54.0 mm. At the same time an adult female, obtained in the middle of March, was in a state close to proestrus. The total weight of the sexual system was 13,020 mg; the length of the uterus

was 51.0 mm, its left horn was 101.0 mm long and its right one - 93.0 mm.

The epithelium of the vagina was multi-layered (consisting of 7-8 rows of cells), and thickening and a certain hornification of the cells were observed in the upper layers. The epithelium of the uterus is highly cylindrical, its lumen has a star-shaped form, and its glandular layer is well developed; the muscles of the wall are enlarged and noticeably hyperemic, and the blood vessels of the walls are dilated.

In the ovaries there were many follicles in various stages of development, from the primordial (50-60 μ) to close to graafian follicles (700-1000 μ), with an enlarged cavity, distinctly isolated by an egg cell, surrounded by the corona radiata. A few intermediate-sized atretic follicles are encountered. The tissue of the ovary is permeated by noticeably enlarged blood vessels. The corpora lutea of lactation are small, up to 600 μ, and degenerate. The milk glands are well developed, and the nipples are extended, i. e. the female was feeding.

Upon getting one's bearings in these materials, the results of the study of spermatogenesis, and also the data on the duration of the proestrous state in species with an

analogously occurring cycle, it is possible to assume that estrus and also mating occur in wolverines and extend from the end of April-June.

The analysis of literature once again attests to the weakly studied character of reproduction in this species, and the contradictoriness of information based on episodic visual observations, and apparently, it is difficult at the present time to form an opinion about the geographical variability of the reproductive periods.

The reproduction of wolverines has been relatively better studied in Alaska (Wright and Rausch, 1955; Rausch and Pearson, 1972), in Sweden and Finland (Krott, 1959, 1960). The reproductive periods of this species, which they indicated, are close to those obtained by us. Apparently it is possible to consider that heat among wolverines to the north of the 60° parallel occurs at the end of spring - the beginning of summer (table 1)

Pregnancy proceeds with a prolonged delay in the development of the embryo. Judging from the encounters of blind pups in lairs (7 encounters) there are 2-4 young; on the average there are 2.6 young. They are born at the end of winter - the beginning of spring.

Table 1. Wolverine Reproductive Periods

Страна, регион (1)	Время гона (2)	Рождение молодых (3)	Продолжительность беременности (мес.) (4)	Авторы (5)
СССР (6)				
Алтай (7)	август (20)	—	—	Дулькейт (1953) (35)
(8) Московский зоопарк	июнь — июль (21)	—	—	Мантейфель (1947) (36)
(9) Европейская часть и Южная Сибирь	декабрь — январь (22)	апрель — май (30)	4	Адлерберг и др. (1935) (37)
(10) Карельская АССР	апрель — июнь (23)	февраль — март (31)	9—10	Данилов (1968) (38)
(11) Северо-Запад европейской части	май — июнь (24)	февраль — апрель (32)	8—9	наши данные (39)
(12) Архангельская обл.	июль — сентябрь (25)	—	—	Паровщиков (1960) (40)
(13) Печоро-Илычский заповедник	июнь — сентябрь (25)	март — апрель (27)	9—10	Теплов (1955) (41)
(14) Таймыр	март — апрель (27)	март (33)	12	Макридин (1964) (42)
(15) Обобщенные данные	июль — сентябрь (25)	апрель — май (30)	7—9	Новиков (1956, 1963) (43)
(16) Дания	июнь — июль (21)	—	—	Wright, Rausch (1955)
(17) Швеция, Финляндия	июнь — июль (21)	февраль — март (31)	8—9	Krott (1959, 1960)
(18) США				
(19) Аляска	июнь — октябрь (28)	февраль — апрель (32)	9—10	Wright, Rausch (1955)
(19) Аляска	май — июль (29)	февраль — март (31)	8—9	Rausch, Pearson (1972)

KEY: 1 - Country, region; 2 - Time of heat; 3 - Birth of young; 4 - Duration of pregnancy (months); 5 - Authors; 6 - USSR; 7 - Altai; 8 - Moscow Zoo; 9 - European Part and Southern Siberia; 10 - Karelian ASSR; 11 - Northwestern region of the European Part; 12 - Arkhangel'sk Oblast; 13 - Pechoro-Ilychskiy Preserve; 14 - Taymyr; 15 - Generalized data; 16 - Denmark; 17 - Sweden, Finland; 18 - USA; 19 - Alaska; 20 - August; 21 - June-July; 22 - December-January; 23 - April-June; 24 - May-June; 25 - July-September; 26 - June-September; 27 - March-April; 28 - June-October; 29 - May-July; 30 - April-May; 31 - February-March; 32 - February-April; 33 - March; 34 - April-May; 35 - Dul'keyt; 36 - Manteyfel'; 37 - Adlerberg et al.; 38 - Danilov; 39 - our data; 40 - Parovshchikov; 41 - Teplov; 42 - Makridin; 43 - Novikov.

Badger (Meles meles L.)

Badger females attain sexual maturity in the 3rd year. It is possible to form an opinion about this from the state of the gonads of young and mature animals in the most active period (the pre-heat and heat period). The sexual sphere of young females (1+), obtained at the end of May, was in a quiescent state. The epithelium of the vagina was 2-3 layers thick, the walls of the uterus were thin, its epithelium was of cubical form, the lumen has the form of a narrow slit, the uterine glands were weakly developed and were not secreting. In the ovaries there were primordial and small crescent and atretic follicles, up to 330-550 μ in diameter.

A completely different picture was observed in the mature females (2+ and older). At the beginning of June females which had been spayed (3+) and those females (2+) entering into reproduction for the first time were in the estrous state. The epithelium of the vagina numbered up to 17 layers of cells. The upper 5-7 layers are highly compressed, and they have been become cornified, and their active desquamation is observed (fig. 1, a). The lumen of the uterus has a star-shaped form, its epithelium is highly cylindrical, and the glands are well developed and are secreting. The walls are thickened and hyperemic (fig. 1,

b). The ovaries contain large (900-1000 μ) follicles, which are close to rupturing (fig. 1, c).

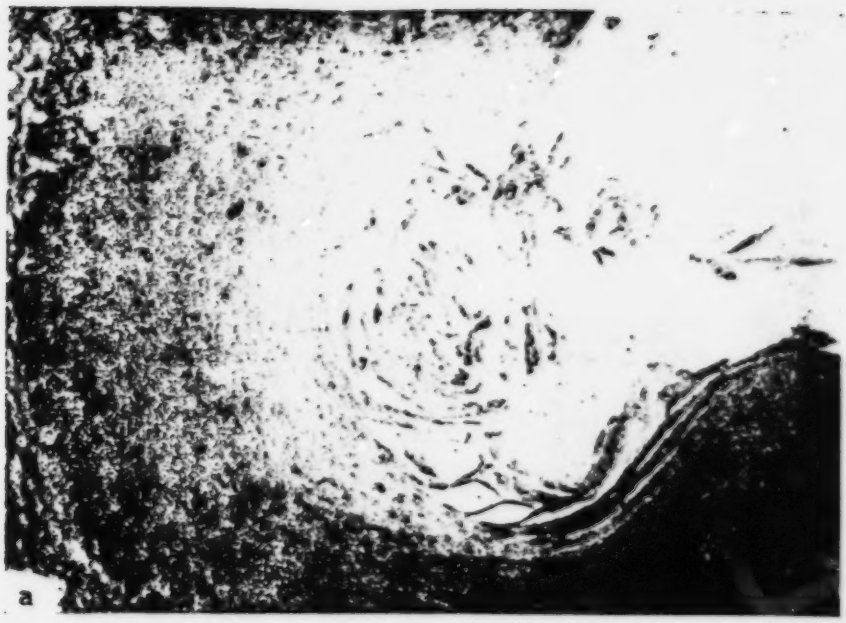
In mature females - which have given birth and are lactating - estrus comes somewhat later, since active lactation inhibits the ovulation of egg cells. Moreover, significant individual differences, apparently, are characteristic of badgers during the periods of the approach of estrus and mating. For example, one of the females, attained in the second half of June, was in metestrus and simultaneously was completing lactation. Corpora lutea, which had recently formed and were in the last stage of vascularization and had a diameter of 1700-1800 μ, were detected in her ovaries, which attests to the fact that mating had already occurred.

Other females which were feeding, and which had been obtained at the same time, were only in a stage close to proestrus. There were corpora lutea of lactation in their ovaries, which almost were not distinguished from the surrounding tissue and, apparently, rapidly degenerated. At the same time large vesicular follicles, 750-800 μ in size, were also encountered. The epithelium of the uterus was highly columnar, and the folds of the mucous membrane were tortuous, however significant hyperemia was not observed. The epithelium of the vagina was 5-7 layers thick, and a certain thickening of the cells was noted only in the

surface layer, and there was no cornification.

Moreover the final phase of proestrus and, apparently, even the initial phase of estrus were observed in a feeding female, obtained in Karelia in the middle of July. The epithelium of the vagina was 9-12 layers thick, the external layers of cells of the functional epithelium were thickened and cornified. There was slight desquamation of these cells. The uterus was considerably hyperemic. The ovaries contained corpora lutea of lactation with weakly expressed boundaries, and also large follicles close in external appearance to graafian follicles which were as much as 1000 μ in diameter.

Proceeding from what has been stated, it is possible to assume that estrus and consequently heat in badgers in the northwestern area of the European Part of the USSR are somewhat extended and occur in spring and the beginning of summer (April-June). Mating can also occur in July, which Unger (1955) notes for Central Europe. The extended character of the reproductive periods is explained, firstly, by the nonsimultaneous entry of females which have given birth and have been spayed and animals of different age groups into reproduction, and secondly, by the geographical variability of reproductive periods (table 2).



a

b

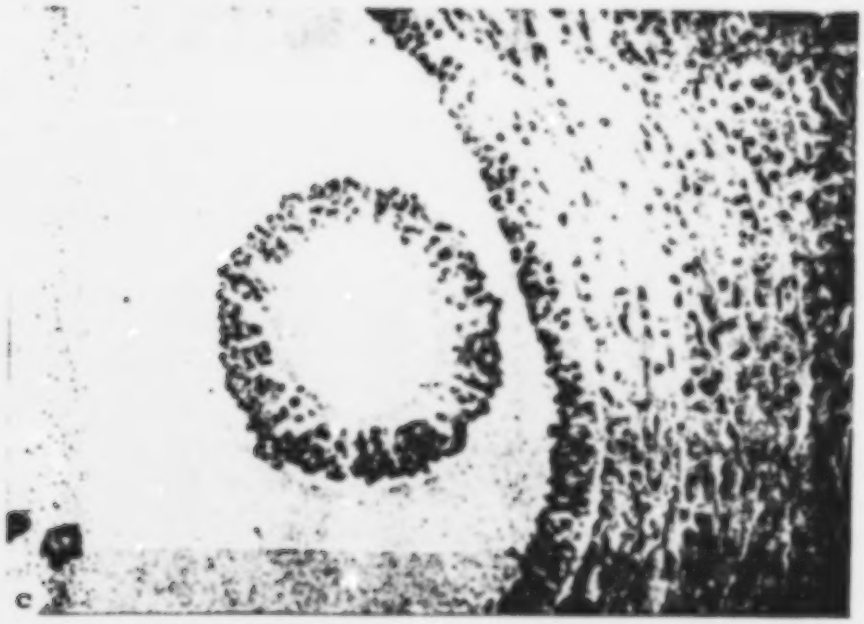


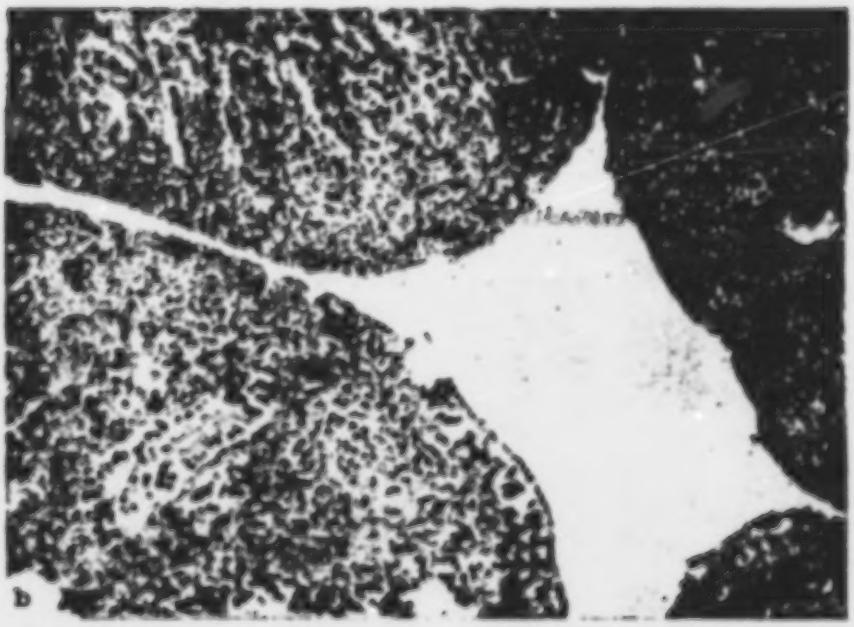
Fig. 1. The sexual sphere of the badger in the estrous state a - vagina; b - uterus; c - ovaries.

Table 2. Reproductive Periods of the Badger

Страна, регион (1)	Время гона (2)	Рождение молодых (3)	Продолжительность беременности (мес.) (4)	Авторы (5)
Франция, юго-запад (6)	январь — февраль (12)	январь — февраль (12)	11	Canivenc (1966, 1967); Canivenc a. oth. (1968);
Англия (7)	март — май; июль — сентябрь (13) (14)	февраль (16)	—	Harrison, Neal (1956)
Англия (7)	март — май (13)	февраль — март (17)	10—11	Neal (1958)
Центральная Европа (8)	июль — сентябрь (14)	январь — март (18)	7—8	Fischer (1931)
Центральная Европа (8)	июль — сентябрь (14)	февраль — март (17)	7—8	Stubbe (1970)
Швеция (9)	май — июль (15)	март (19)	9—10	Notini (1948)
(10) СССР, северо-запад	май — июль (15)	апрель — май (20)	10—11	наши данные (22)
СССР, обобщенные данные (11)	май — июль (15)	апрель — май (20)	12	Новиков (1936, 1963) (23)
СССР, обобщенные данные (11)	—	март — апрель (21)	—	Гептнер и др. (1967) (24)

KEY: 1 - Country, region; 2 - Time of Heat; 3 - Birth of Young; 4 - Duration of Pregnancy (months); 5 - Authors; 6 - France, southwest; 7 - England; 8 - Central Europe; 9 - Sweden; 10 - USSR, northwest; 11 - USSR, generalized data; 12 - January-February; 13 - March-May; 14 - July-September; 15 - May-July; 16 - February; 17 - February-March; 18 - January-March; 19 - March; 20 - April-May; 21 - March-April; 22 - our data; 23 - Novikov; 24- Geptner et al

a



b

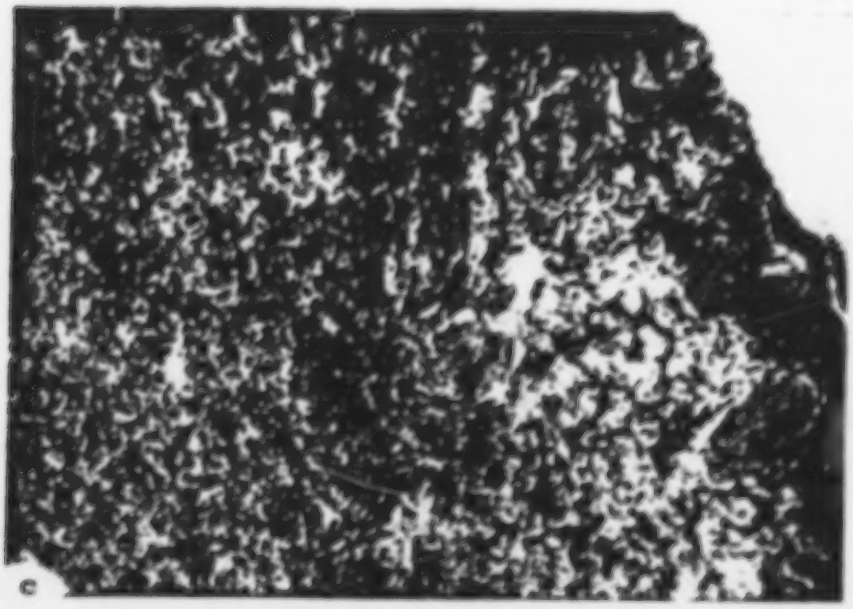


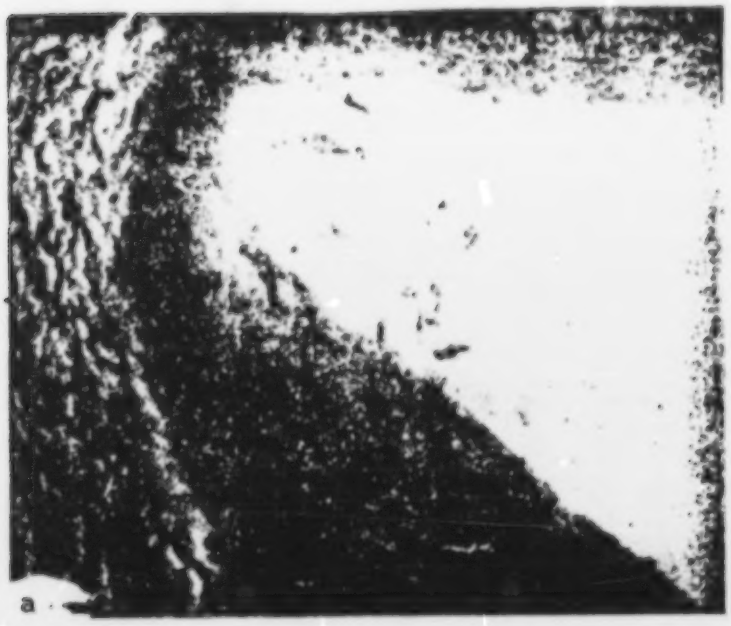
Fig. 2. The state of the reproductive organs of the pregnant female badger (September-December): a - vagina; b - uterus; c - ovaries.

In autumn the reproductive organs of young and adult animals are almost indistinguishable in external aspect, however the histological differences are very significant. In young immature females the epithelium of the vagina is 2-3 layers thick, the walls of the uterus are thin, and the glandular layer is not too well developed. Small crescent, and more frequently atretic follicles, 100-200 μ in

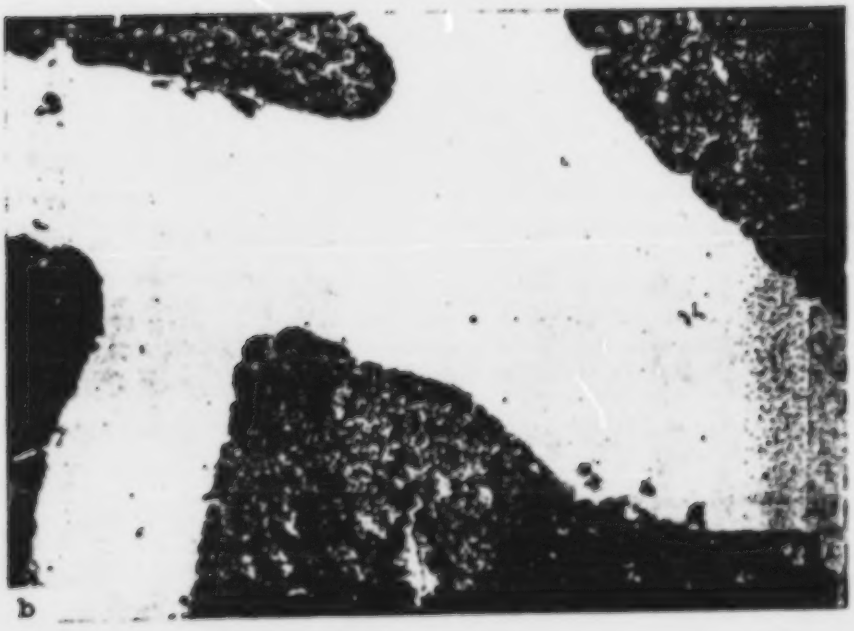
diameter, predominate in the ovaries; follicles with a size of 500 μ are infrequently encountered and, as a rule, after having attained this size, degenerate. A certain activation of follicular activity is noted in December, when individual vesicular follicles become as large as 600-700 μ.

The epithelium of the mucous membrane of the vagina of mature females is also 2-3 layers thick (fig. 2, a), however the mucous membrane of the uterus is highly tortuous and has a dendroid character, and the glandular layer is well developed (fig. 2, b). The ovaries contain corpora lutea of pregnancy with dimensions of 1200-1400 μ, many small vesicular atretic follicles 150-300 μ and single crescent ones up to 400 μ in diameter (fig. 2, c). This state is characteristic of the period from October through December inclusively.

The whelping of badgers in our region occurs in April-May. The earliest litter was detected in the first ten days of April. There were a total of 1-4 pups in a litter over the course of 7 observations, with an average of 2.7 pups. Thus, the total duration of a badger pregnancy in the northwestern area of the European Part of the USSR can be defined as equal to 10-11 months, including an 8-9 month diapause. The young pups grow rather quickly and attain a weight of 5-6 kg by autumn.



a



b

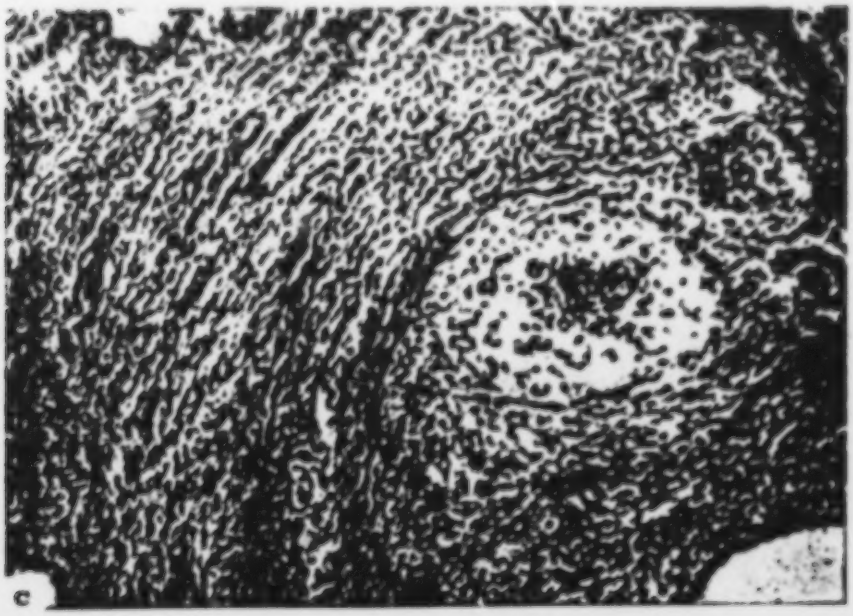


Fig. 3. The initial phase of metestrus and pregnancy in the otter (end of March):
a - vagina; b - uterus; c - ovaries

Otter (Lutra lutra L.)

We were not able to trace the entire cycle of transformations in the sexual sphere of the otter over the course of a year due to the absence of material, and an investigation of the wild animals at our disposal has not as yet given a clear answer with regard to otter mating periods.

The noted increase in the mobility of otters, remarked in nature, at the end of winter - the beginning of spring, is accompanied by significant changes in the sexual organs of the females. The functions of the generative organs are activated in the animals in the first half of March. The uterus is noticeably hyperemic, the uterine glands are well developed, their secretion is evident in the lumen of the uterus, and its epithelium is highly columnar. There are rather large vesicular follicles, up to 800 μ in diameter, in the ovaries. A similar state can be defined as the initial phase of proestrus.

The estrous state is noted in certain wild animals at the end of March. The epithelium of the vagina has 10-12 layers, there are surface layers of cells with missing nuclei, and cornified cells are exfoliating (fig. 3, a). The lumen of the uterus is star-shaped, the muscle walls are noticeably thickened and hyperemic, and the secretion of the uterine glands is noticeable in the lumen (fig. 3, b). There are recently ovulated follicles in the ovaries in the initial stage of the formation of corpora lutea (their cavity is filled with cells, which also covered the basilar membrane of the follicle, and with blood). The diameter of the newly formed corpora lutea is 1200-1400 μ. There are also atretic follicles (up to 450 μ) and crescent follicles (up to 800 μ) in the ovaries; and there are also many small

atretic follicles (fig. 3, c). However at the same time in other wild animals only the initial phase of the activation or the end of anestrus - the beginning of proestrus has been recorded. The epithelium of the vagina is 6-7 layers thick, and only slight cornification is noticed in one upper layer of the functional epithelium. Desquamation was not observed. Individual follicles in the ovaries are as large as 800 μ.

Somewhat later, in the beginning of May, a female in the estrus period was obtained. The epithelium of the vagina was 8-11 layers thick, the upper layers which were cornified were exfoliating. The uterus was highly hyperemic, the muscle walls were thickened, numerous uterine glands were well developed, and its lumen was star-shaped. There were large, up to 1650 μ, follicles in the ovaries, which were close to rupture. They were framed in the vicinity by a network of enlarged blood vessels.

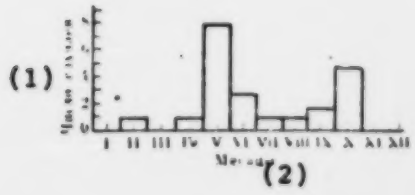


Fig. 4. Whelping periods of the Otter (from data of encounters of litters with blind pups)
KEY: 1 - Number of cases; 2 - Months.

The activation of the functional state of the sexual sphere of spayed females is observed in October-December. In the beginning of October the walls of the uterus are slightly thickened and hyperemic, and the folds of the mucous membrane have a tortuous character. In the ovaries there are large (up to 1100 μ) mature follicles with large (up to 165 μ) egg cells, and also medium-sized crescent and atretic follicles with dimensions of up to 450 μ. Already by the end of January the proestrous state is observed - the walls of the uterus are enlarged and hyperemic, its lumen is star-shaped; and there are very large (up to 1600 μ) mature follicles in the ovaries.

In autumn in pregnant females there are corpora lutea (up to 1200 μ) and rather large individual (up to 1000 μ) vesicular follicles, and also a large quantity of small and intermediate-sized atretic follicles in the ovaries.

The state of the sex organs of females of this year's brood at the same time differs sharply from what has been described. The vaginal epithelium is 2-3 layers thick. Their uterus is infantile, and the glandular layer is not expressed. The ovaries contain numerous primordial follicles, and intermediate-sized atretic and crescent follicles with dimensions of up to 800 μ.

Thus, it is not possible to make any definite statement about the heat of the otter on the basis of the material which has been presented. It is necessary, apparently, to consider tentative mating periods: for mature animals - February-March, and for those entering into reproduction for the first time - May-June. Moreover, it is also necessary to also consider the geographic peculiarities of the territories, which are included in the composition of the northwestern area of the European Part of the USSR.

The whelping of otters, judging from the locations of nests with blind pups, occurs, just as the period of heat, during the course of two more less expressed periods in April-June and in August-October (fig. 4). The adult females, whose heat is in March, and whose pregnancy lasts about 13 months, apparently whelp in spring. The females, which have entered into reproduction for the first time, whelp at the end of summer-autumn with the same duration of pregnancy. Probably, the otter females mate and bear offspring within a year.

There are 1-4 young in a litter, with an average of 2.5 (11 observations). The young of the first litters remain with the mother until October-November, and pups from late litters, - apparently, until spring, which is attested to by encounters of rather large otters with the mother in winter and summer. Towards the time of the separation of the

offspring from the mother the young have reached a weight of 3-4 kg.

Conclusion

In the northwestern area of the European Part of the USSR it is possible to break down mustelids into 3 groups in accordance with their reproductive peculiarities: 1) species without an embryonal diapause - weasel, polecat, marsh otter; 2) species with a short delay in implantation - mink; 3) species with a prolonged delay in implantation - ermine, marten, wolverine, badger, otter. Moreover it is also possible to divide all the species into groups in accordance with a number of other peculiarities: time of the arrival of sexual maturity, periods of heat, fertility, times of the birth of young, duration and character of litter life, etc. (fig. 5).

The polecat, marsh-otter and mink attain sexual maturity and participate in reproduction at the age of 11-12 months. In the weasel and the ermine heat occurs at the beginning of summer, and these species are already entering into reproduction in the second year of life. For the remaining representatives of the family a later appearance of sexual maturity is characteristic (marten, wolverine,

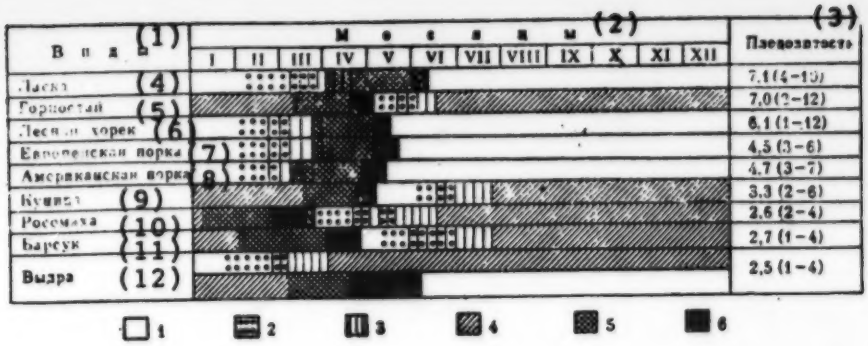


Fig. 5. A diagram of the sexual cycle of females of certain mustelids:
1 - quiescence; 2 - proestrus; 3 - estrus; 4 - pregnancy before implantation; 5 - true pregnancy; 6 - varieties
KEY: 1 - Species; 2 - Months; 3 - Fertility; 4 - weasel; 5 - ermine; 6 - polecat; 7 - marsh-otter; 8 - mink; 9 - marten; 10 - wolverine; 11 - badger; 12 - otter.

badger, otter); only a small portion of the females of these species enter into reproduction in the second year of life; the majority of them begin to reproduce only in the third year.

There are also significant differences in the periods of heat. In species without diapause, with the exception of the weasel or those having a short diapause, heat is observed at the beginning of spring; in species with a prolonged delay in the implantation of the embryo - at the beginning-middle of summer. This adaptive accomodation makes it possible for pregnant females to favorably survive a severe winter period and to time the appearance of immature pups until the warm season.

All the small representatives of the family multiply annually; part of the females of the wolverine, badger and otter, apparently do not participate in reproduction every year.

The fertility of the mustelids is in direct dependence on the dimensions of the wild animals and the duration of their lives. The intensity of reproduction compensates not only for the duration of the life of individuals, but also for the sharp fluctuations in the number of species in the case of unfavorable conditions of existence, which is especially sharply expressed in species with a narrow specialization in nutrition.

Bibliography

Adelberg G. P., Vinogradov B. S., Flerov K. K., Smirnov N. A. - 1935. Zveri Arktiki - (Wild Animals of the Arctic), Leningrad.

Geptner V. G., Naumov N. P., Yurgenson P. B., Sludskiy A. A., Chirkova A. F., Bannikov A. G. - 1967, Mlekopitayushchiye Sovetskogo Soyuza - (Mammals of the Soviet Union), vol. 2, part 1, Moscow, "Vysshaya Shkola".

Danilov P. I. - 1968, Biologiya i khozyaystvennoye znacheniye kun'ikh v Karelii - (Biology and the Economic Importance of Mustelids in Kareliya). Avtoref. kand. diss. (Author's Abstract of Candidate's Dissertation). Petrozavodsk.

Dul'keyt G. D. - 1953. Znacheniye rysi i rosomakhi kak khishchnikov v prirodnom komplekse Altayskoy taygi. V sb.: "Preobrazovaniye fayny pozvonochn. nashey strany (biotekhnicheskiye meropriyatiya - (The Importance of the Lynx and Wolverine as Predators in the Natural Scheme of the Altay Taiga. In the Col.: "The Transformation of Vertebrate Fauna in Our Country (Biotechnical Measures)." Izd. MOIP. (Publishing House of the Moscow Society of Naturalists).

Makridin V. P. - 1964. O rasprostranenii i biologii na Kraynem Severe. "Zool. zhurn." ("Propagation and Biology in the Extreme North., Zoological Journal"), vol. 43, iss. 11.

Manteyfel' P. A. - 1947. Zhizn' pushnykh zverey (The Life of Fur-Bearing Wild Animals). Moscow.

Novikov G. A. - 1956. Khishchnyye mlekopitayushchiye fauny SSSR (Predatory Mammaliam Fauna of the USSR). Moscow-Leningrad, Izd-vo AN SSSR (Publishing House of the Academy of Sciences of the USSR).

Novikov G. A. - 1963. Khishchnyye. V kn.: "Mlekopitayushchiye fauny SSSR (Predators. In the book: "Mammalian Fauna of the USSR"), part 2, Moscow-Leningrad, Izd-vo AN SSSR (Publishing House of the Academy of Sciences of the USSR).

Parovshchikov V. Ya. - 1960. K biologii rosomakhi i vydry. "Zool. zhurn." (The Biology of the Wolverine and the Badger. "Zoological Journal."), vol. 39, iss. 7.

Teplov V. P. - 1955, K zimney ekologii rosomakhi v rayone Pechoro-Ilychskogo zapovednika. "Byull. MOIP" otd. biol. (The Winter Ecology of the Wolverine in the Region of the Pechoro-Ilychskiy Preserve. "Bulletin of the Moscow Society of Naturalists", Department of Biology), vol. 60, iss. 1.

Canivenc R. - 1966. A Study of Progestation in the European Badger (Meles meles L.). In: "Comparative Biology of Reproduction in Mammals". Academic Press, London.

Canivenc R. - 1967. La Fonction Luteale Chez Le Blaireau Europeen Meles meles L. :Arch. Anat. Microsc et Morphol. Exptl.", vol 56, No. 3-4.

Canivenc R., Bonnin-Laffargue M., Relexans M.-C. - 1968. Cycles Genitaux de Quelques Mustellides Europeen "Cycles Genit. Saisonn. Mammifer Sauvages", Ser. Physiol., No. 1, Paris.

Fischer E. - 1931. Die Entwicklungsgeschichte des Daches und die Frage der Zwillingsbildung. "Verhandl. Anad. ges Breslaus anat. anz. B. V. LXXII". Erganzungsheft.

Harrison R., Neal E. - 1956. Ovulation During Delayed Implantation and Other Reproductive Phenomena in the Badger (Meles meles L.). "Nature", vol. 177, No. 4517.

Krott P. - 1959. Der Vielfrass. Im: "Monographie der Wildsaugetiere", Bd. XIII, Jena.

Krott P. - 1960. Der Vielfrass. Im: "Die Neue Brehm-Buecherei", Wittenberg, Lutherstadt.

Neal E. - 1958. The Badger. Penguin Books Ltd. London.

Notini G. - 1948. Biologiska Undersoknigar Over Gravlingen. Uppsala.

Rausch R., Pearson A. - 1972. Notes on the Wolverine in Alaska and the Yukon Territory. "J. Wildlife Monag.: vol. 36, No. 2.

Stubbe M. - 1970. Populationsbiologische Untersuchungen am Dachs Meles meles L. "Hercynia", Bd. 7, H. 1-3.

Unger A. - 1955. Die Paarungszeit des Daches. "Forst u Jagd, A5", Nr. 2.

Wright Ph. L., Rausch R. - 1955. Reproduction in the Wolverine, Gulo gulo. "J. Mammal.", vol. 36, No. 3.

ЛИТЕРАТУРА

Адлерберг Г. П., Виноградов Б. С., Флеров К. К., Смирнов Н. А. 1935. Звери Арктики. Л.

Гептнер В. Г., Наумов Н. П., Юргенсон П. Б., Слудский А. А., Чиркова А. Ф., Банников А. Г. 1967. Млекопитающие Советского Союза, т. 2, ч. 1. М., «Высшая школа».

Данилов П. И. 1968. Биология и хозяйственное значение куньих в Карелии. Автореф. канд. дисс. Петрозаводск.

Дулькейт Г. Л. 1953. Значение рыси и росомахи как хищников в природном комплексе Алтайской тайги. В сб.: «Преобразование фауны позвоночн. нашей страны (биотехнические мероприятия)». Изд. МОИП.

Макридин В. П. 1964. О распространении и биологии росомахи на Крайнем Севере. «Зоол. журн.», т. 43, вып. 11.

Мантейфель П. А. 1947. Жизнь пушных зверей. М.

Новиков Г. А. 1956. Хищные млекопитающие фауны СССР. М.—Л., Изд-во АН СССР.

Новиков Г. А. 1963. Хищные. В кн.: «Млекопитающие фауны СССР», ч. 2. М.—Л., Изд-во АН СССР.

Пароещников В. Я. 1960. К биологии росомахи и выдры. «Зоол. журн.», т. 39, вып. 7.

Теплов В. П. 1955. К зимней экологии росомахи в районе Печоро-Илычского заповедника. «Бюлл. МОИП», отд. биол., т. 60, вып. 1.

Canivenc R. 1966. A study of progestation in the european badger (*Meles meles* L.). In: «Comparative biology of reproduction in Mammals». Academic Press. London.

Canivenc R. 1967. La fonction luteale chez le blaireau europeen *Meles meles* L. «Arch. anat. microsc. et morphol. exptl.», t. 56, № 3—4.

Canivenc R., Bonnin-Laffargue M., Relexans M.-C. 1968. Cycles genitaux de quelques mustellides europeens. «Cycles genit. saisonn. mammifer sauvages», sct. physiol., № 1. Paris.

Fischer E. 1931. Die Entwicklungsgeschichte des Dachses und die Frage der zwillingsbildung. «Verhandl. Anad. ges Breslaus anat. anz., B. V. LXXII». Erganzungsheft.

Harrison R., Neal E. 1956. Ovulation during delayed implantation and other reproductive phenomena in the badger (*Meles meles* L.). «Nature», vol. 177, No. 4517.

Krott P. 1959. Der Vielfrass. Im: «Monographie der Wildsaugetiere», Bd. XIII. Iena.

Krott P. 1960. Der Vielfrass. Im: «Die neue Brehm-Bücherei». Wittenberg, Lutherstadt.

Neal E. 1938. The badger. Penguin Books Ltd. London.

Nolini G. 1948. Biologiska Undersokningar over grevlingen. Uppsala.

Rausch R., Pearson A. 1972. Notes on the wolverine in Alaska and the Jukon Territory. «J. Wildlife Manage.», vol. 36, No. 2.

Stubbe M. 1970. Populationsbiologische Untersuchungen am Dachs *Meles meles* L. «Hercynia», Bd. 7, H. 1—3.

Unger A. 1955. Die Paarungszeit des Dachses. «Forst. u Jagd. A 5», Nr. 2.

Wright Ph. L., Rausch R. 1955. Reproduction in the wolverine, *Gulo gulo*. «J. Mammal.», vol. 36, No. 3.

THE REPRODUCTIVE CYCLES OF SOME MUSTELIDAE SPECIES

P. I. Danilov, I. L. Tumanov

Summary

The sexual sphere of 935 females of 9 species of Mustelidae was investigated. These data are supplemented by direct observation on captive and wild animals. In the northern part of the European USSR polecats and European and American minks reach sexual maturity in the first year of life, weasels and ermines in the second year, and the majority of females of other represenatives of the family, only in the third year of life. The calendars time of run and mating is March — June in the weasel, May — June in the ermine, late February — April in the polecat, late March — April in the European mink, late February — March in the American mink, July in the pine marten, May — June in the wolverine, May — July in the badger and February — June in the otter.